Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Telecommunications Relay Services and	)	
Speech-to-Speech Services for Individuals	)	CG Docket No. 03-123
With Hearing and Speech Disabilities	)	

COMMENTS OF NEUSTAR, INC.

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April 8, 2008

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SUMMARY

NeuStar, which is the Administrator of the North American Numbering Plan ("NANP") for the Commission and which also manages the Number Portability Administration Center ("NPAC") for the telecommunications industry, offers a detailed proposal to assign ten-digit NANP telephone numbers to users of all IP-based forms of TRS. Under NeuStar's Telephone numbers for Relay Users – or TRU – plan, Relay Providers will obtain NANP telephone numbers from local exchange carriers ("LECs") and assign these numbers to deaf and hard of hearing users ("Deaf/HoH"). Working with their LEC numbering partners, the Relay Providers will provision the numbers into the NPAC, including a Uniform Resource Identifier ("URI") in addition to the customary NPAC data.

Most telephone calls to relay users will route normally through the public switched telephone network ("PSTN") to the users' Relay Providers. When the Relay Providers receive the calls, they will route them to the users' IP-based relay devices using IP addresses. Calls from relay users work the same way only in reverse – the user establishes an IP link to a Relay Provider, which in turn routes the call over the PSTN.

URIs, a common Internet addressing type, are necessary for two types of calls: first, for hearing persons to be able to use a Relay Provider different than the default Relay Provider selected by the Deaf/HoH call recipient, and second, to enable a Deaf/HoH person to call another Deaf/HoH person without the direct intervention of a Relay Provider. In those two cases, the URI stored in the NPAC is needed to identify the relay user's default Relay Provider so that it can be queried, using standard Internet interfaces, to provide the relay user's IP address.

NeuStar's TRU plan promotes functional equivalency in that it provides Deaf/HoH users with NANP TNs in the same manner that they are provided to hearing persons that use IP-based

voice telephone service and it will no longer be necessary to know a Deaf/HoH person's IP address in order to reach them. TRU also enables Relay Providers to use a Registered Location process for E9-1-1 and thus support the capability for Relay Providers to provide this service to their users in the same manner that VoIP providers do to their customers today. In addition, TRU will ensure that the telephone numbers assigned to relay users are fully portable by the users, just as hearing persons port their numbers today between service providers and even service types. The plan also promotes interoperability between Relay Providers and relay users. In addition to other benefits, TRU also protects the privacy and security of relay users by forming an environment where only relay providers and their subscribers are able to exchange IP calls, by restricting access to the routing data to authorized relay providers and by permitting relay users to regain the protection of their firewalls for their devices.

Because NeuStar's TRU plan involves amending its existing contract to manage the NPAC rather than obtaining a new database and because the processes it proposes are already in use by VoIP providers, NeuStar believes that TRU can be implemented in a relatively short time, certainly before December 31, 2008, for a relatively low cost.

NeuStar's TRU plan also benefited from the scrutiny of the Industry Numbering Committee ("INC"), which spent nearly two years examining the technical and operational aspects of providing telephone numbers to the users of Video Relay Service ("VRS"). TRU is consistent with the recommendations made by the INC in December 2007 and works with not only with VRS but will all IP-based TRS.

NeuStar strongly encourages the Commission to adopt its TRU plan so that the deaf and hard of hearing who use IP-based TRS can begin to enjoy the benefits of 10-digit NANP telephone numbers and receive E9-1-1 capability as soon as possible.

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NeuStar, Inc. ("NeuStar") submits these Comments in response to the Public Notice issued by the Consumer & Governmental Affairs Bureau seeking to refresh the record on assigning Internet Protocol ("IP")-Based Telecommunications Relay Service ("TRS") users ten-digit telephone numbers ("TNs" or "TN" if singular) linked to the North American Numbering Plan ("NANP").[1]

I. INTRODUCTION

NeuStar first became aware of concerns that the telephone numbering system was inadequate to provide the functionally equivalent telecommunications services to the deaf and hard of hearing ("Deaf/HoH") community using Video Relay Service ("VRS") or IP-Relay Service when Communications Services for the Deaf, Inc. ("CSD") raised the issue in a November 30, 2005 correspondence to the North American Numbering Council ("NANC"),[2]

[1] *Consumer & Governmental Affairs Bureau Seeks to Refresh Record on Assigning Internet Protocol (IP)-Based Telecommunications Relay Service (TRS) Users Ten-Digit Telephone Numbers Linked to North American Numbering Plan (NANP) and Related Issues*, CG Docket 03-123, Public Notice, DA 08-607 (rel. Mar. 19, 2008)(*2008 Numbering PN*); *see also Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities*, CG Docket 03-123, Declaratory Ruling and Further Notice of Proposed Rulemaking, 21 FCC Rcd 5442, 5459-62, paras. 44-57 (May 9, 2006)(*Interoperability FNPRM*).

[2] North American Numbering Council Meeting Minutes, November 30, 2005 (Final)

followed by an in person presentation on the issue at the NANC's January 24, 2006 meeting.[3] During its presentation, CSD told the NANC that:

> In order for VRS to be functional equivalent to voice telephone services, deaf and hard of hearing individuals, using video broadband communications, need uniform and static end-point numbers linked to the NANP that will remain consistent across all VRS providers, so that they can contact one another and be contacted to the same extent that PSTN and VoIP users are able to identify and call one another. CSD requests that the NANC support dialing uniformity for VRS and point-to-point video users.[4]

At NANC's request, the Alliance for Telecommunications Industry Solutions' ("ATIS") Industry Numbering Committee ("INC") embarked on a nearly two year examination of the technical and operational issues raised by the "Video Relay Service (VRS) interoperability issue" that CSD brought to the NANC.[5]

In May 2006, the Commission issued the *Interoperability FNPRM* seeking comment on, *inter alia*:

> the feasibility of establishing a single global database of proxy numbers for VRS users that would be available to all service providers, so that a hearing person can call a VRS user through any VRS provider, and without having first to ascertain the VRS user's current IP address.[6]

It is the record generated in this proceeding that the Consumer & Governmental Affair Bureau is seeking to refresh.

NeuStar is not a telecommunications service provider, nor does it have any stake in the VRS or IP Relay business. Instead, NeuStar is a trusted, neutral third party that, on behalf of the Federal Communications Commission ("Commission"), is the North American Numbering Plan Administrator ("NANPA") and the Pooling Administrator ("PA"). In addition, on behalf of the telecommunications industry, NeuStar manages the Number Portability Administration Center

[3] North American Numbering Council Meeting Minutes, and January 24, 2006 (Final)
[4] *Ibid*
[5] *Ibid.*
[6] *Interoperability NPRM* at para. 44.

("NPAC"). In response to the *Interoperability FNPRM*[7] and as well as in the INC process, during which NeuStar actively applied its extensive numbering expertise, NeuStar put forward a comprehensive plan to assign ten-digit NANP TNs to VRS users[8] and to use the NPAC to associate those numbers with Uniform Resource Identifiers ("URIs") and, ultimately, with the IP addresses of video phone ("VP") and other IP-based equipment used by the Deaf/HoH users. NeuStar also presented this plan to the Commission in a series of ex parte meetings.[9] A detailed white paper description of NeuStar's Telephone Numbers for Relay Users, or TRU, plan is attached to these comments as Appendix A.

II. GOALS OF AN IP-BASED TRS NUMBERING PLAN

In developing TRU, NeuStar first examined the goals that should be accomplished by any IP-based TRS ten-digit numbering plan. In NeuStar's view, any numbering solution for the Deaf/HoH should, at a minimum, accomplish the following: Functional equivalency to the telecommunications services provided to hearing persons,[10] including, *inter alia*: E9-1-1 services that use the same approach and systems that are currently used by VoIP providers;[11] portability between relay providers, and interoperability between relay providers and all relay users. Because these TRS services are Internet-based, any plan must also ensure the privacy of the Deaf/HoH's consumer data and provide Deaf/HoH users with security from Internet

[7] *See* NeuStar *Interoperability FNPRM* Reply Comments. It is worth noting that several parties raised the need to have a neutral, third party database administrator such as the NPAC manage the database of VRS related telephone numbers. *See, e.g.*, Verizon *Interoperability FNPRM* Comments at 4 and Consumer Groups *Interoperability FNPRM* Comments at 6.

[8] Although the *Interoperability FNPRM* focused solely on providing ten-digit NANP number to VRS users, NeuStar notes that the *2008 Numbering PN* seeks comment on the "issues relevant to assigning users of ALL IP-based forms of TRS . . . numbers linked to the North American Numbering Plan."[emphasis added] NeuStar's proposal, though originally designed for VRS users, can accommodate all forms of IP-based TRS.

[9] See, *e.g.*, NeuStar *Notice of Ex Parte*, CG Docket 03-123, filed January 17, 2006 and NeuStar *Notice of Ex Parte*, CG Docket 03-123, filed February 29, 2008.

[10] *See Interoperability NFPRM* at para. 5. ("Congress specifically mandated in Section 225 that relay services offer access to the telephone system that is "functionally equivalent" to voice telephone services.")

[11] *See Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing Disabilities; E911 Requirements for IP-Enabled Service Providers*, CG Docket No. 03-123, WC Docket No. 05-196, Report and Order, FCC 08-78 (rel. March 19, 2008)(*E911 R&O*) at para. 22.

attacks.[12] A plan should also mitigate relay fraud, be consistent with existing technology and accepted standards, and provide one solution to support all relay services. Finally, the system must be cost effective and, given the aggressive deployment schedule sought by the Commission, the system must be capable of rapid implementation.[13]

III. MEETING THE GOALS

A. Summary of NeuStar's TRU plan

Pursuant to TRU, VRS providers and other IP-based TRS providers (collectively "Relay Providers") will obtain NANP TNs from local exchange carriers ("LECs") and assign these numbers to Deaf/HoH users who have selected them as default providers.[14] This is exactly the same manner through which most VoIP providers obtain and distribute telephone numbers today. The Relay Providers, working with their LEC numbering partners, will provision the numbers into the NPAC, providing a Uniform Resource Identifier ("URI")[15] in addition to the customary NPAC data. This URI will be used only in certain circumstances, described in more detail below, to route a telephone call to the video phone ("VP") or other IP-based device of the called party. NPAC data is routinely downloaded either to carriers or to NPAC clearinghouses[16] where the data can be queried as calls are being placed. The URI will be used by any Relay Provider to route calls to a user of another Relay Provider.

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[12] *See* "Numbering for Internet-Based Relay Services," ATIS Report 0300093 (December 19, 2007) discussion of security issues at section 6.0. (*INC Report*)

[13] See *E911 R&0* at para. 1 ("[T]he Commission will require that the ten-digit numbering plan be implemented no later than December 31, 2008.")

[14] *See* NeuStar White Paper at Section 2.

[15] URI's are "short strings that identify resources in the web: documents, images, downloadable files, services, electronic mailboxes, and other resources, e.g. sip:1794867309@provider.com or http://www.w3.org/Addressing/#background." *Inc Report* at p. 32

[16] There is a highly competitive market of NPAC clearinghouses. NeuStar itself provides such clearinghouse services and competes with VeriSign, Syniverse, NetNumber, Syncronoss and others for the query business of smaller carriers that do not wish to download the entire NPAC database to their own networks.

Relay Providers will maintain lists of the IP addresses of the devices employed by users who have selected them as default providers; this list will be dynamically updated as the IP addresses change.[17] These IP addresses will be used route calls to the Deaf/HoH users.

Direct-dialed calls to a relay subscriber's TN are routed through the public switched telephone network ("PSTN") to the Relay Provider using traditional telecommunications routing. Upon receiving the PSTN call, the Relay Provider routes the call to one of its Relay Operators ("RO")[18] and, using the IP address maintained in its directory, establishes an Internet connection with its subscriber's VP.[19]

Direct-dialed calls from a relay subscriber to a hearing person work in a reverse but similar manner. The relay subscriber establishes an Internet connection with his/her default provider or with any VRS or other IP-based relay service provider they chose. The relay service provider then establishes a PSTN connection to the hearing person.[20]

As mentioned above, the URI information that has been associated with a TN in the NPAC database is needed to complete calls in only two circumstances. First, if a hearing person chooses to call a Deaf/HoH person through a Relay Provider that is not the Deaf/HoH person's default provider, the chosen Relay Provider needs to be able to determine which VRS provider is the default provider for the relay use. The chosen Relay Provider will first query the database of an NPAC clearinghouse service to obtain the URI associated with that TN; the URI directs the

[17] *See* NeuStar White Paper, Appendix A, at Section 5.
[18] NeuStar recognizes that traditional TRS operators are known as Communications Assistants ("CAs"), VRS operators are known as Video Interpreters ("VIs":), and IP-based Relay operators are known as Relay Operators ("ROs"). Throughout this document, NeuStar uses the term Relay Operator as a generic designation for any individual utilized by a Relay Provider to provide relay services through signed, voice or text response.
[19] *See ibid.* at Section 5.1.
[20] *See ibid.* at Section 5.2

chosen Relay Provider to the default Relay Provider, which uses its IP address directory to direct the call to the relay user's device.[21]

The second circumstance where the URI database is necessary is when a Deaf/HoH person calls the TN of another Deaf/HoH person to establish a connection that does not require an RO. The calling party's device places the call through its default Relay Provider. The calling party's default Relay Provider will query a NPAC clearinghouse to obtain the URI associated with that number and, using the URI, will direct the call to the default Relay Provider of the called party. The called party's default Relay Provider will use its IP address directory to complete the call to the called party's device.[22]

Although there may be some concern that NeuStar's proposed approach to obtaining routing information – i.e., querying the NPAC for the URI and then querying the default Relay Provider for the IP address of the device – is less efficient than a direct query of a single central database for an IP address, it should be stressed that the signaling involved in NeuStar's two-step approach takes only milliseconds. In addition, as will be discussed in more detail below, NeuStar strongly believes that the two-step approach is critically necessary for purposes of functional equivalency, application to all forms of IP-based TRS, privacy and, very importantly, security.

B. Achieving Functional Equivalency

NeuStar's proposal to use the NPAC as the authoritative database for TNs used for routing of VRS and other IP-based TRS traffic promotes functional equivalency in a number of ways. First, it provides Deaf/HoH users with NANP TNs in the same manner as they are provided to hearing persons that use IP-based voice telephone service. These are not "proxy"

[21] *See ibid*. at 5.1.
[22] *See ibid*. at 5.3.

numbers or proprietary numbers such as have been used by some VRS providers. Instead, these are real NANP ten-digit numbers that appear in all respects the same as numbers assigned to hearing persons. Second, it will no longer be necessary to know the Deaf/HoH person's IP address in order to reach them. Instead, any hearing or Deaf/HoH person in the world can call one of these TNs and be connected to the Deaf/HoH person to whom the TN is assigned. Third, because these are standard TNs, all of the features that TNs make possible in the PSTN – features such as in-bound and out-bound caller ID and other Advanced Intelligent Network ("AIN") features – will be available to the Deaf/HoH.

1. E9-1-1 Capability

A component of functional equivalency, but critically important in its own right, is the availability of E9-1-1 capability. When a hearing person uses a wireline or VoIP telephone to place an emergency 9-1-1 call, the call is immediately routed to the appropriate public safety answering point ("PSAP") along with the address and TN from which the person is calling.[23] Deaf/HoH video relay users do not have the same capability currently. For example, when placing a 9-1-1 call under the Commission's recent *E911 R&O*, a video relay user must connect to a VRS provider and sign their address to the VI, who in turn has to manually look up the PSAP serving the caller's location, place a call to an administrative line at the PSAP and voice the location to the 9-1-1 call taker. Because the user lacks a meaningful telephone number, there are also limited means for the PSAP to call the user back if the call gets interrupted, or later, if further information is required.

NeuStar proposes that VRS and other IP-based relay services should use the same system for providing their users with E9-1-1 capability as is used by VoIP providers today. The VoIP

[23] In the case of a VoIP call, the address will be that which the person provided when registering with the VoIP provider. If the person has not informed the VoIP provider of an updated address, the information provided to the PSAP will be incorrect.

providers use a Registered Location process, keyed by the telephone number, that enables a specialized provider called a "VoIP Positioning Center" ("VPC") to determine which PSAP should get the call and assists in sending the call to an "Emergency Services Gateway" (ESGWs) network operator which maintains a series of gateways connected to the 9-1-1 selective routers need to reach the appropriate PSAP. The VPC also facilitates automatic transmission of the location of the caller to the PSAP. NeuStar's TRU proposal will facilitate the IP-based TRS providers' transition to this solution.[24]

2. Number Portability

The NeuStar plan also promotes functional equivalency by enabling Deaf/HoH users to port their TNs from one IP-based TRS provider to another, or from one service mode to another, just as hearing persons can change their service providers and service mode.[25] This will enable Deaf/HoH users to select any provider they wish to be their default provider and, if not happy with the service, leave them free to move to a different service provider. Significantly, the Deaf/HoH are also free on a call-by-call basis to use an IP-based Relay Provider that is other than their default provider in a manner similar to how a wireline caller can choose a long distance carrier other than their default LD carrier for a particular call.

In the analogous VoIP market, there had been concern that because VoIP providers become the users of record when obtaining TNs from LECs, they would not let their subscribers port numbers to competitors. The Commission recently resolved this issue by holding that the ultimate end-user, not the VoIP provider, has control over their TN.[26] The precedent established

[24] *See 911 R&O* at para. 22-24. For a more detailed description of NeuStar's proposal in this regard, *see* NeuStar White paper at Section 5.4.
[25] For example, a number can be ported from a wireline service to wireless service.
[26] *Telephone Number Requirements for IP-Enabled Services Providers* (WC Dkt No. 07-243), *Local Number Portability Porting Interval and Validation Requirements* (WC Dkt No. 07-244), *IP-Enabled Services* (WC Dkt No. 04-36), *Telephone Number Portability* (CC Dkt No. 95-116), *CTIA Petitions for Declaratory Ruling on Wireline-*

in that proceeding should resolve any doubt that the TNs that Relay Providers obtain from LECs in the same manner as VoIP providers can be fully ported by the Deaf/HoH end users.

3. Interoperability Between Relay Providers and Relay Users

NeuStar's TRU proposal enables any caller to reach any relay user through the Relay Provider of their choice.[27] Thus, a caller can choose any Relay Provider to reach a Deaf/HoH person, even though the Deaf/HoH person may have selected a different provider. Likewise, because of the interoperability built into the NeuStar proposal, even though a Deaf/HoH relay user has selected a default provider, he may choose a different Relay Provider to use for an outgoing call on a call-by-call basis. In both directions, this is an important capability, particularly if the default provider is experiencing long wait times.

C. Protecting the Privacy of User's Information

NeuStar's numbering proposal helps to protect the privacy of IP-based TRS users by making it more difficult for hackers to associate the TNs of users with their IP addresses. Some numbering proposals that have been suggested would place a list of TNs and their dynamically updated IP addresses on the open Internet[28] where they will be susceptible to discovery. Worse, as discussed in more detail below, these solutions also require that the Deaf/HoH's firewalls be left open to accept incoming traffic to those IP address.

NeuStar's approach keeps TNs and their associated IP addresses off the open Internet. First, NPAC is a secure database that only downloads information to certified carriers and authorized clearinghouses. Second, because NeuStar's approach utilizes URIs, the information

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Wireless Porting Issues, Final Regulatory Flexibility Analysis, Numbering Resource Optimization (CC Dkt No. 99-200), Report and Order, Declaratory Ruling, Order on Remand, and Notice of Proposed Rulemaking (rel. Nov. 8, 2007)(*VoIP LNP Order*) at para 31.

[27] Within the same mode of IP-based TRS service.

[28] *See*, e.g., CSDVRS, Inc., *Ex Parte Notice*, March 13, 2008.

contained in the NPAC – and which is downloaded only to the carriers and clearinghouses – does not directly associate TNs with IP addresses.

D. Maintaining Security

All VRS systems in use today require that the Deaf/HoH users open the firewalls of their VP or other IP-based device in order to receive calls coming in over the Internet – the equipment is thus set to accept any communication from whatever source that is sent to the equipment's IP address. Likewise, any IP-based TRS numbering plan that proposes to use a single database of TNs associated with the IP addresses of Deaf/HoH users will perpetuate – and perhaps even worsen this problem.[29] Indeed, the INC Report noted that the DNS solution put forward by AT&T provided "no filtering of incoming traffic based on the source IP address . . . because the user does not know in advance the IP addresses of the entities making the call."[30] This open firewall makes the VP and other IP-based devices extremely vulnerable to Internet attacks.[31]

NeuStar's proposal requires that, when turning on their equipment, Deaf/HoH relay users register[32] with their default Relay Provider, similar to the way many computer users log onto networks today, and identical to how all VoIP devices register with their service providers.[33] Registration enables protected firewall configurations to work, because most firewalls require a device inside the firewall to send a message to a server outside the firewall first. After the first inside to outside communication, the firewall will permit an outside to inside communication.

[29] As noted above, some proposals would place lists of TNs and associated IP addresses on the open Internet. If those lists were compromised, attackers would have not only the TN and IP information, they would also know that those users had open firewalls.
[30] *INC Report* at 28.
[31] Some may argue that this is not a substantial problem for these proposals since it leaves the users no worse off than they are today. The Commission, though, should not settle for purported solutions that continue to expose users to Internet attacks when there is a solution available that can better protect these users.
[32] The term "register" here should not be confused with the registration process a user completes once with a default provider to enable service and to obtain, if they need one, a telephone number. Rather, "register" is used here as a technical term referring to the process by which a device announces its availability, and its IP address to its service provider. This registration, a standard feature of both H.323 and SIP signaling enables systems to direct incoming calls to the correct device even if the IP address changes if the service is accessed from different locations.
[33] This registration process can be automated into the devices start up sequence.

The registration message allows the firewall to permit subsequent communication, but only with the server to which the original registration message was sent. Further, TRU proposes that the default provider will only accept calls from its own registered users, from the PSTN or from another provider, which is also limiting access to only registered users. In this manner, which is identical to the processes used by VoIP providers, firewalls can be managed to permit only authenticated communications rather than being forced open to accept anything.[34]

E. Mitigating Relay Fraud

Unfortunately, the open nature of current IP-based TRS relay systems, particularly IP relay, have enabled some people to abuse these systems to commit fraud. These activities generally take the form of an individual calling into a Relay Provider and using the relay service to communicate with a store or other vendor to make fraudulent purchases. Relay Providers are required to act as neutral, transparent agents in this activity and are not permitted to make subjective judgment calls as to the appropriateness or legality of the call being processed. Therefore, they must process these calls even if the Relay Provider suspects that this type of fraudulent activity is occurring. As noted above, NeuStar's solution allows only authenticated users to access the system. In addition, because NeuStar's proposal enables the full features of the telephone network to be utilized, caller ID will be passed from the caller through to the call's recipient, removing the anonymity exploited by those who wish to abuse the system for their own gain.

F. Consistent with Existing Technology and Accepted Standards

It is important to recognize that the Internet is continually evolving. Therefore, it is important that the numbering solution that the Commission adopts is based upon open systems and accepted standards to ensure that all Relay Providers and their users can utilize the system.

[34] *See* NeuStar White Paper at Section 4.

NeuStar's approach is based upon standard technology, much of which is already in use in the analogous VoIP market, and adheres to accepted industry standards as promulgated by the Internet Engineering Task Force ("IETF") and other recognized standards bodies.

G. One Solution to Support All Relay Services

There are different forms of relay services that require telephone numbers: video relay, IP relay and even TTY relay. Some forms of relay, such as IP relay, are not capable of using IP addresses,[35] so any solution that uses IP addresses will not work for IP relay. It is important that the TRS numbering solution that is adopted by the Commission be consistent for all forms of relay. Fortunately, NeuStar's URI approach is a consistent approach that works with all forms of relay.

NeuStar particularly notes that even traditional TRS and STS users could be afforded all of the benefits of TRU. A telephone number (different from the number that directly reaches the TTY or STS phone) could be assigned by (or ported to) a TRS or STS provider. Direct dialed calls to that number would create a relay call to the TTY/STS phone automatically. 9-1-1 calls through relay would route correctly, and automatic location would be provided to the PSAP.

H. The Numbering System for IP-Based TRS Must Be Cost Effective and Capable of Being Deployed Rapidly

NeuStar believes the most cost effective and rapid means for ten-digit NANP numbers to become available is for the Commission to order that the NPAC be utilized as the authoritative database for URIs associated with the TNs of Deaf/HoH IP-based TRS users. The Commission should understand that whatever database is selected, it will not be populated with a significant number of Deaf/HoH TNs. It is estimated that there are some 100,000 VPs in use today, a very

[35] Any service that relies on a computer for the device, such as IP Relay requires a URI. An IP address is insufficient to identify the device, the service, and the protocol needed to communicate. URIs are defined to provide such information, and are appropriate for all forms of relay.

small number compared to the hundreds of millions of TNs currently in use in the United States. Although this number will undoubtedly grow as telephone numbers make VPs and other devices more useful, it is likely not cost effective to invest in the design, development, deployment, testing and roll-out of a new, untested platform. Additionally, such an endeavour would require a separate procurement to select a new database administrator. Given that the size of the market is limited and that the NPAC is a fully deployed, operational platform managed under an existing contract, it would be a relatively easy endeavor to modify the current contract to accommodate and serve the needs of the Deaf/HoH.

NeuStar is prepared to add the necessary fields to the NPAC within 14 days of receiving approval from the NAPM LLC to make the change and believes it can do so inexpensively.[36] The effective rate for NPAC transactions ranges from $0.75 to $0.95 per transaction,[37] so the cost of adding the initial 100,000 TNs (each corresponding to a transaction) will be relatively small. Relay Providers will need to change their procedures and systems to accommodate the new numbering plan but, because NeuStar's proposal contemplates using the procedures and systems that are virtually identical to those used by VoIP providers today and because the proposal uses widely accepted standards, the costs to the TRS providers should be lower than if a new and non-standards based system is utilized. Using current technology, Relay Providers will not be forced to purchase trunks into every rate center that they wish to serve. Instead, they can establish one or several points of presence – using Time Division Multiplexing ("TDM") or Session Initiate Protocol ("SIP") connections – with their LEC numbering partner, while paying the partner a small fee for transport.

[36] In April 2007, similar URI fields were added to Canada's NPAC. The Canadian NPAC is built and operates on the same software platform as the United States NPAC; adding URI fields to the NPAC will be at no cost to the industry.

[37] The exact effective rate depends on the calculation of an annualized total transaction volume, which fluctuates from month-to-month.

NeuStar notes that the Commission indicated in its recent *E911 R&0* that it planned to have a ten-digit numbering plan for IP-based TRS users in place no later than December 31 of this year. The time it takes to deploy such a numbering system has critical significance because, as the Commission noted, the Registered Location process that is required for IP-based TRS providers to offer E9-1-1 service in a manner identical to that offered by VoIP providers depends on the availability of a ten-digit numbering plan being in place.[38] Any delay in implementing the numbering plan will also delay the availability of this important E9-1-1 capability to the Deaf/HoH.

NeuStar believes that its solution can be deployed rapidly – certainly well before December 31 – because it requires only a contract modification and uses existing processes and accepted standards. In contrast, a solution that will require a request for proposal process to obtain a neutral, third party to establish and maintain an entirely new database will take considerable time to implement. It often takes as long as eighteen months to design and conduct the procurement, evaluate bids and select the vendor, and test and implement the service. If that holds true, a ten-digit numbering plan will not be in place until well into 2009 – and, consequently, E9-1-1 for the Deaf/HoH will be delayed. The Deaf/HoH community deserves better – and can have it if the Commission adopts NeuStar's approach.

IV. THE REPORT OF THE INDUSTRY NUMBERING COMMITTEE

In the *2008 Numbering PN* the Consumer & Governmental Affairs Bureau noted that ATIS had recently released a report based on the work of the INC, which had reviewed the technical and operational issues associated with providing ten-digit NANP numbers to the users of IP-based Relay Providers. The Bureau sought comment on the INC's suggestions and conclusions.

[38] *E9-1-1 Order* at para. 22.

As noted in the introduction above, NeuStar was an active participant in the INC's deliberations on this issue and found the process to be extremely helpful to sift through the proposals and concepts that were presented. Many potential options were discounted as careful scrutiny exposed deficiencies; another proposal presented to the INC underwent significant change as a result of the process. The proposal that NeuStar submitted to the INC is substantially the same as the proposal it is submitting to the Commission today.

NeuStar's proposal is consistent with the INC recommendations. The INC recommended that:

- relay users be assigned geographic NANP numbers, reflecting their location if desired, which will route to the relay provider of their choice when dialed by a hearing caller
- the relay users obtain numbers through the relay service providers. Additionally, relay users should be able to obtain NANP numbers directly from a voice service provider, or utilize an existing number, if desired.
- relay providers obtain numbering resources either from voice service providers or, if they choose, by qualifying to obtain resources from NANPA or the PA under existing guidelines
- a central database managed by a neutral third party can be deployed to support interoperability between relay providers.[39]

The value of the INC review, conducted over nearly a two year period, cannot be overstated. NeuStar strongly recommends that the Commission does not adopt any proposal that has not benefited from a similar close examination.

V. CONCLUSION

NeuStar's TRU proposal to use the NPAC as the central database for a ten-digit numbering system for IP-based relay users promotes functional equivalency, including supporting Registered Location for E9-1-1 and providing full number portability. It also helps to ensure the privacy and security of Deaf/HoH users, helps

[39] *INC Report* at 29. Use of the NPAC as the central database was one of the solutions examined by the INC.

to mitigate relay fraud, is consistent with existing technology and accepted standards, and provides a single solution to support all relay services. NeuStar's plan was also fully vetted from a technical and operational standpoint by ATIS' Industry Numbering Committee.

Importantly, because it amends an existing program, NeuStar's TRU approach is cost-effective and can be implemented rapidly, certainly before December 31, 2008.

For the reasons stated above, the Commission should adopt the ten-digit NANP numbering plan for IP-based TRS users that NeuStar has put forward.

Respectfully submitted,

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Telephone Numbers for Relay Users ("TRU")

NeuStar Inc.
Brian Rosen
Senior Director

1. Background

Telecommunications Relay Services ("TRS") have evolved tremendously since Title IV of the Americans with Disabilities Act of 1990 first codified basic elements that required common carriers to provide communication services for deaf and hard of hearing ("Deaf/HoH") customers. Today, TRS users have a wide range of communications options, from traditional TTY-based relay, through specialized relay options such as Voice Carry Over ("VCO"), Hearing Carry Over ("HCO") and Speech-to-Speech ("STS"). As the communications industry continues to integrate IP-based solutions into their services portfolio, new innovations have entered into the market. IP-based solutions such as Instant Messaging relay ("IP Relay"), Video Relay Services ("VRS") and some forms of Captioned Telephone provide new options to improve communications for Deaf/HoH consumers.

The popularity of these forms of relay has grown tremendously. IP-based relay allows Deaf/HoH users to communicate through any text-enabled instant messaging system or device. VRS allows deaf users to communicate naturally through American Sign Language ("ASL"). These IP-based relay solutions have seen explosive growth and increased adoption within the community. Despite the growing popularity and use of this communications method, however, technical issues have plagued wide-spread adoption of these services.

About NeuStar

NeuStar (NYSE: NSR) provides the North American communications industry with essential clearinghouse services. We operate the authoritative directories that manage virtually all telephone area codes and telephone numbers, and enable the dynamic routing of calls among thousands of competing communications service providers (CSPs) in the United States and Canada. Since 1996, NeuStar has served as the Local Number Portability Administrator for North America, operating the Number Portability Administration Center (NPAC). Through this function, performed under the auspices of the US Federal Communications Commission (FCC) and the Canadian Radio-television and Telecommunications Commission (CRTC), NeuStar clears all telephone number portability transactions in North America and broadcasts the associated routing updates to enable the dynamic routing of calls among thousands of competing communications service providers

About the Author

Brian Rosen is Senior Director at NeuStar where he serves as a systems architect and a subject matter expert on VoIP and 9-1-1. Mr. Rosen is also the chair of the LTD work group in NENA defining the technical standards for Next Generation 9-1-1 as well as co chair of the p2psip working group in the IETF.

A Deaf/HoH person uses some form of relay service that provides interpretation of sign language or typed text into spoken language in order to place telephone calls to hearing persons. Relay providers provide the link using some form of video or text conversation between a Deaf/HoH person and an interpreter (referred throughout this document as a Relay Operator or "RO") to translate the conversation. TTY uses a TTY device on a traditional telephone line. Video Relay Service (VRS) uses a video connection to a Video Interpreter ("VI") with sign language interpreted to voice. IP Relay uses Instant Messaging (IM) or other forms of text carried over IP networks to the RO who interprets text to voice. Captioned Telephone uses a specialized caption telephone device or captioning through a web-site that permits voice carry over to all parties with a simultaneous text caption stream. Speech to Speech (STS) services use a specially trained interpreter to re-voice persons who may not be able to communicate clearly with hearing persons.

All of these services have the same fundamental service arrangements. A voice telephone call is established between the RO and the hearing person over another connection through the Public Switched Telephone Network (PSTN) or over the Internet. A call between the Deaf/HoH person and the RO is established. The RO interprets between the hearing person and the Deaf/HoH person.

NeuStar proposes that users of all forms of relay have geographically-based telephone numbers. The TRU solution provides the capability to:

- Allow a hearing person to direct dial the TN of a deaf/HoH person, and have the call automatically established using a default relay provider chosen by the deaf/HoH person
- Allow a deaf person to direct dial the TN of a hearing person, and have the call automatically established using a default relay provider chosen by the deaf/HoH person
- Allow a deaf person to call a hearing person using any relay provider of their choice
- Allow a hearing person to call a deaf/HoH person using any relay provider of their choice
- Allow a deaf/HoH person to call another deaf/HoH person by dialing their TN

Since the inception of relay services, providers, regulators and consumers have all worked to develop communications services that provide ***functional equivalence***. TRU provides a significant advance in functional equivalence

Key characteristics of TRU include:

- Ease of Use: A continuing obstacle in the attempt to achieve functional equivalence is the ease of use of contacting Deaf/HoH individuals. Unlike services available to hearing consumers, relay calls are processed through relay providers through the dialing of an access number (e.g. 7-1-1, a toll-free access number of a chosen relay provider) and then providing the telephone number of the person to be called. While the introduction of 7-1-1 has simplified this process to a degree, it is still adds another step in the communication process. VRS has introduced another complexity in that instead of simply knowing a 10-digit phone number, callers either need to know the IP address or the registered User Name of the person to be contacted and IP-relay requires the user to provide an IM Screen Name. TRU eliminates the need for this and requires that a caller only knows the assigned telephone

number of the relay user – just as if the caller were placing a traditional (POTS) telephone call.

- 9-1-1 Access: TRS providers are required to enable automatic emergency call handling through their relay platform. The FCC recently ordered VRS providers to do so. IP Relay currently has no requirement. Therefore users of alternative relay options such as VRS and IP Relay do not have easy access to emergency services. For example VRS users must communicate with a Public Safety Access Point ("PSAP") through an alternative telephone number, such as the PSAP administrative line, rather than using the 9-1-1 selective router. This means that the Deaf/HoH user has no automatic location information and therefore must indicate their location to the RO who manually accesses the PSAP database to lookup the PSAP that serves the location, places a call to the administrative line and voices the location to the 9-1-1 operator. In an emergency situation, these lost seconds could be critically important. Further, with no call back telephone number, the PSAP is unable to easily reconnect with the caller if needed. Through TRU, all relay users will have a location-based telephone number that facilitates automatic emergency call processing in a manner that is identical to VoIP callers.
- Provider Choice and Portability: The ability to freely choose your relay provider is a critical element of a consumer-driven market. NeuStar agrees that choice of provider should be available to all relay users. For example, while some VRS users can "choose" their own provider it is a cumbersome process. Through TRU, the relay user's telephone number and provider of choice will be maintained in a centralized database (the Number Portability Administration Center or "NPAC"). An additional benefit of using a centralized database is the ability for relay users to freely change providers while maintaining the same phone number. The ability for relay users to take advantage of portability is a great stride towards achieving functional equivalence.
- Data Privacy: All consumers should be concerned about the privacy of their personal data, especially in relation to information available through IP services. Deaf or hard of hearing users may be more vulnerable to threats to their privacy because some systems and solutions have lists of TNs and/or IP addresses that are accessible on the public Internet. Current systems are being abused, and one of the reasons for this abuse is that data that is meant to provide services for users is available to attackers to use for other purposes. It is essential that any mechanisms to serve Deaf/HoH persons not allow information such as telephone numbers and Internet addresses of Deaf/HoH persons to fall into the wrong hands.
- Security: Many current VRS systems require users to disable their firewalls in order to receive calls. As a result, consumers – and the systems and data that they need to protect – is exposed to considerable risk of attack. The VoIP community faced a similar problem, but their systems have evolved to work with normal consumer protections in place (e.g. through SIP registration). Any numbering solution for relay users must take similar steps to protect the security of the Deaf/HoH.
- Cost Effectiveness: In general, relay services are charged to the "TRS Fund" which is funded through a surcharge or rate adjustments on telephone bills. Therefore, there is a tendency to treat improvements to the system as "free", since the fund covers the cost of improvements (albeit normally by evaluating provider cost when calculating a reimbursement rate). Given this method of funding, and in order to minimize the impact to

consumers, it is important that a relay numbering solution consider the costs to deploy the solution. NeuStar believes TRU is the least expensive solution because it relies on an existing database (the NPAC) with an existing operator (NeuStar) and because it uses standard based signaling and procedures common in the larger VoIP industry.

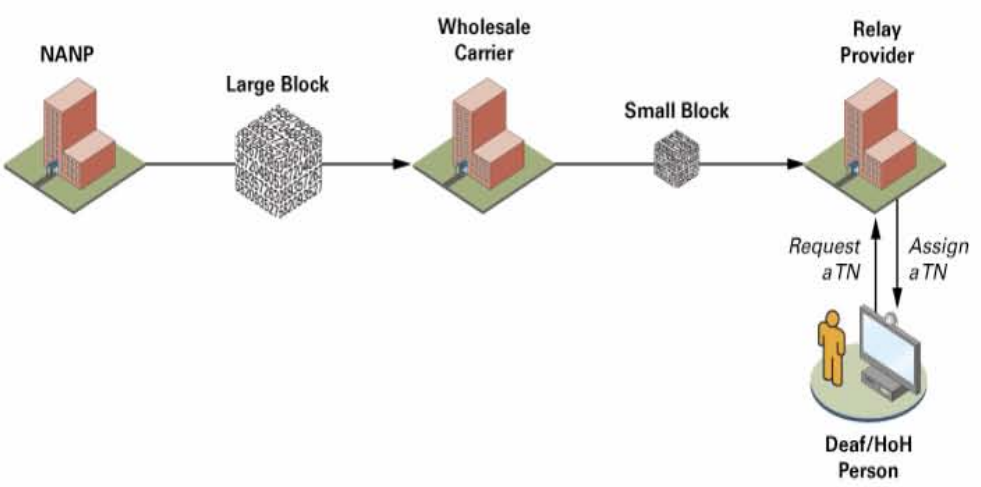
- Rapid Implementation: There has been considerable demand for years within the VRS user community for a solution that provides telephone numbers for VRS devices. The FCC has an open docket and there have been congressional calls for immediate action. The need for a solution is apparent and immediate. Equally important is the ability to quickly implement the solution once it is accepted. The FCC has indicated that it will decide on any approach by the end of the second quarter of 2008 and will require deployment by the end of 2008. Therefore, legitimate solutions must be able to meet this implementation and deployment schedule.
- Compliance with Accepted Standards: It is imperative that the adopted solution be available to all potential relay users and providers. As a result, solutions designed to proprietary standards or along a closed set of instructions or standards are risky considerations. The Internet continues to evolve at a tremendous rate. However, instead of divergent innovations based upon varied standards that would fracture the entire eco-system, Internet developments have generally adhered to an accepted set of industry standards (generally promulgated by the Internet Engineering Task Force ("IETF"). Similarly, the relay numbering solution must be designed to common signaling and media standards in order to support the broadest base of consumers and providers.
- Mitigation of Relay Fraud: Unfortunately, relay has been used to defraud the public. IP Relay, specifically, is used by individuals who pretend to be deaf, engage a relay provider, and place a call using relay. Relay providers are unwitting accomplices to this kind of fraud, and the open nature of relay services today makes it easy for attackers to exploit the openness. It would be highly desirable for the solution to assist in mitigating fraud and potential consumer impact.

2. Assigning Telephone Numbers to Users

Telephone Numbers (TNs) are provided by the North American Number Plan Administrator (NANPA) in blocks of numbers to certified telephone carriers. Presently, most telephone number allocation is performed in blocks of 1,000 numbers.

Most VoIP service providers are not certified by state regulatory commissions and, therefore, do not meet the definition of telephone carriers. As a result, they cannot obtain TNs and must therefore get their telephone numbers from certified carriers who act as wholesale providers. These wholesale carriers provide numbers, often in smaller blocks (tens at a time in some cases), along with connections to the public switched telephone network (PSTN). Calls to these numbers are routed to the wholesale carrier, who routes them to its VoIP customer, who routes them to its subscriber.

This model works well in the VoIP environment and would be the same mechanism for providing telephone numbers to relay providers.



Using TRU when a user registers[1] with a relay provider, if they do not currently have an existing locality-based telephone number, the relay provider will assign one to them which is geographically appropriate for their location. It is important to note that these are "local" numbers not toll-free numbers. Calls to them from within their local calling area would be local calls. Note that wholesale carriers do not serve every rate center and therefore will not have truly local numbers available for every location. There are several viable solutions to this. The user could select a number which is not immediately local but is "close" which is the typical solution offered by VoIP providers. Alternatively, a local telephone number from a LEC service the user could be obtained and "remote call forwarding" ("RCF") would be employed to connect a caller to the actual service provider. The use of RCF would inhibit some functionally equivalent services such as Caller ID.

Number portability is the mechanism by which users can keep their telephone number while changing service providers. Number portability is enabled through an authoritative central database called the Number Portability Administration Center (NPAC). Ports are initiated by the new service provider. That is, the service provider that will be servicing the telephone number requests the number be "ported" from the existing provider. When a telephone number is ported from one carrier (Donor) to another carrier (Recipient), the NPAC database is updated to reflect the current servicing carrier. From a consumer's perspective, the telephone number itself is not changed. Through the introduction of a ten-digit telephone number for relay users, relay TNs can be portable just like the TNs of all other telephone users. Changing the consumer's preferred relay service provider will be handled using the existing porting mechanisms. Since

[1] The term "register" is used in two contexts in this whitepaper. Users are expected to register with a relay provider of their choice, which will be the provider used when the calling party does not make an explicit choice of provider. They will receive their telephone number if they don't already have one, or port their existing number to the default provider, and supply an address for E9-1-1 purposes when they register. The Commission and the stakeholders in relay service have used the term "registration" for this purpose. We also discuss later the signaling protocol action that a device completes when it starts up. When configured to do so, devices "register" with a gatekeeper (H.323) or registrar (SIP), supplying credentials to identify the device, and informing the gatekeeper/registrar of their current IP address. "Registration" is the proper technical term for this protocol exchange

the relay providers receive their phone numbers from wholesale carriers, a relay port requires that the relay provider work with its underlying carrier to process the port.

The advantages of using wholesale carriers providing TNs through relay providers include:

- Existing processes and procedures are readily available and work well
- No new regulation is required, either at state or FCC level
- No new entities are required – solution is fast to set up
- Costs are very low – wholesale carriers charge cents per TN per month. There a few other charges
- Relay providers choose their own wholesale carriers in an open, free and competitive market
- Moving from one relay provider to another uses existing number porting processes, which are also existing, readily available, and inexpensive.
- Numbers can be ported in from other existing services, and ported out to any service
- Deaf or hard of hearing persons work directly with their chosen relay provider to get telephone numbers and resolve any issues. If they do not like dealing with that provider, they can change at any time

3. Use of the NPAC as the central database

Through TRU a relay user's telephone number is mapped to an IP based address and maintained in a centralized database. All relay providers will need access to the information contained within this database to successfully route calls.

NeuStar's proposal leverages the NPAC, the existing, proven, authoritative centralized database that currently serves the telecommunications industry. This database presently stores and maintains information regarding which carrier serves a given telephone number. This information is maintained in configurable NPAC database "fields." NeuStar proposes to add a new field to the NPAC that would list the Internet address of the relay user along with the current Service Provider ID code that would identify the video relay provider's underlying wholesale carrier (the certified carrier from whom the relay provider obtained the telephone number). This new field can be quickly and inexpensively added to the existing NPAC database within as little as a fourteen day window from the time the field requirements have been finalized by the industry.

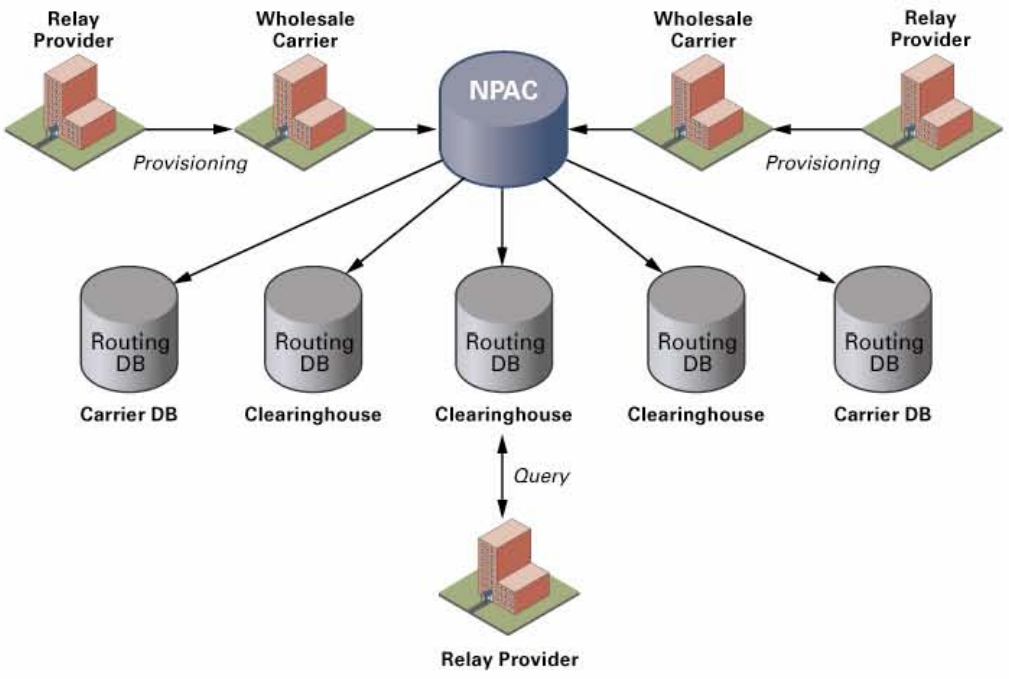
Updates to the NPAC are provided by certified carriers. Relay providers will need to work with their wholesale carrier partners to provide updates as new user register with the relay provider. Carrier systems will need upgrades to handle the new field. New fields are added to the NPAC periodically. It is often desirable for the capability provided by a new field to be available before carrier provisioning systems are updated. NeuStar's NPAC help desk facilitates such updates, and can provide interim processes that can be quickly deployed by carriers to facilitate updates such as that contemplated by TRU. If the wholesale carrier approves, NeuStar can begin accepting URI information for relay user telephone numbers from relay providers via email immediately after the field is available in the NPAC.

It is important to note that the NPAC is not a provisioning database; rather it is a central repository of routing data. Telephone carrier's supply updates to the database from their customer provisioning systems, and the NPAC pushes new routing data to all carriers who load it into their own real time query systems.

Carriers may obtain a local copy of the data which is then queried on every call made. Some smaller carriers, including some VoIP providers, do not maintain their own local feeds; instead, they use a specialized service provider or clearinghouse that provides them with access to a database of NPAC information for real time queries. Some of these clearinghouses or service providers offer services which provide Internet routing information based on NPAC data. In other words, there is an existing market of routing database providers that can be utilized by relay providers.

A concern has been raised by some relay providers, unfamiliar with the NPAC feel that some or all relay providers able to obtain a full NPAC feed will allow those providers to see which numbers were subscribed to which relay providers, which would convey a competitive advantage. The INC report noted this concern and suggested that the database not be available directly to relay providers, but rather clearinghouses holding the entire database be queried by relay providers.

The NPAC has multiple competing clearinghouses that could provide such services.



There are several forms of Internet Addresses. The most specific is an IP address, which is a 32 bit (for IPv4) number which is effectively unique to every device on the Internet and is used for low level addressing for IP. Another form of Internet address is a "Uniform Resource Identifier" (URI). An example URI for TRU solution would be: "sip:1212555121@example_provider.net".

The URI indicates which protocol to use to establish connections (the "sip;" part in the example) and identifies the "domain" of the relay provider ("example_provider.net"). The element between the protocol "scheme" and the domain is the "user" element, and although the example uses a telephone number (12125551212), it could be a name ("jsmith") or a meaningless, but unique string ("a4ddr43eew").

NeuStar proposes that the central database consistently provide URIs. The advantages of always using a URI are:

- The database can be static; no need to update it every time a user connects to the database
- All forms of relay can use it. IP Relay essentially requires a URI and cannot use an IP address. TRS could not use an IP address either.
- Standards compliant. Devices that know how to query using a telephone number and obtain routing information expect a URI, not an IP address
- Assists in security, see the discussion in "Security Issues" below

In order to add a new field to the NPAC, the industry defines the technical requirements for the NPAC modification through the NANC's Local Number Portability Administration (LNPA) Working Group. This step has already been completed, and the technical requirement is contained in NANC Change Order 415. Completed technical requirements are sent to the North American Portability Management LLC (LLC), a consortium of telephone carriers who oversee and administer the NPAC on behalf of the industry, to consider and instruct the NPAC to implement the change NANC Change Order 415 has not been sent to the NAPM for consideration at this time. However once the NAPM receives the change order and make its determination, NeuStar can implement the new field in as little as fourteen days within a scheduled NPAC maintenance window.

The major advantages to using the NPAC as the authoritative central database are:

- NeuStar is a proven Neutral Third Party and is presently contracted to operate the NPAC database which can easily be amended accommodate TRU.
- The NPAC exists now, is reliable and proven. This means the system can be deployed rapidly at a low cost.
- NPAC is the existing way that carriers route calls based on telephone numbers
- The porting process used to change Relay providers would also change the URI, one process, one set of procedures, and one database.
- Costs are lower than developing a new database, and the incremental load on the system for this purpose is negligible
- Each Relay provider is free to choose their own NPAC service provider, in an open and competitive market

Using existing service providers means the relay provider can negotiate the interface they prefer to use for the query, e.g., LDAP, HTTP, DNS, etc

4. Security Issues

As mentioned in Section 1, ensuring the security of Internet based communications is an important consideration in selecting a telephone number solution for relay users. The current relay environment exposes the user's information to misuse and attack. Current VoIP systems do not require opening firewalls and do not permit access to the database by anyone but providers. The chosen numbering solution should provide at least this level of security.

Most residential and enterprise firewalls have the characteristic that they will allow traffic IN only after a user has sent messages OUT to a specific device. Devices outside the firewall cannot initiate communications with any device inside the firewall's protected zone. VoIP systems work this way. The process requires the user's device to send a registration message out from behind its firewall to the default relay provider's server. The server is then allowed to send messages back to the user

Since TRU always has signaling messages going either from the user to their default provider or from the default provider to the user, the firewall can function normally. It is this characteristic of "out first before in" that requires signaling always to traverse the default provider. The user always sends messages only to their default provider, and only accepts messages from this default provider.

Registration involves "credentials", typically a username and password. The relay provider or registrar (gatekeeper) only accepts registration from users who have proper credentials. In this way, the relay provider can control who can have access to its systems to only Deaf/HoH users who currently use them as their default provider.

For the provider, calls that come to it only come from its registered users, from the PSTN, or from other providers. It does not need to accept calls from just any user. Only a user registered at its registrar or registered at some other relay provider's registrar is allowed to place a call to it.

The NPAC database is only available to authorized NPAC users, which generally are telephone carriers or specialty service providers. NPAC data is not allowed to be public, and this is enforced rigidly. It is very difficult for an attacker to get a list of deaf user's TNs or their URIs.

These steps and policies make the TRU proposal much more resistant to attack than current systems or proposals that do not require registrar/gatekeeper registration (and subsequent proxy/gatekeeper routing) of all calls. Deaf or hard of hearing persons will need to select a default relay provider. That provider will issue credentials that only allow authorized users into the system, and all providers will limit calls to only authorized users. This will significantly mitigate the IP relay fraud, so long as relay providers require appropriate verification before authorizing a user and issuing her credentials. Simple steps like requesting return of a post card sent to the registered location will significantly reduce inappropriate use of relay, and cut down on fraud.

The security advantages of the TRU proposal are:

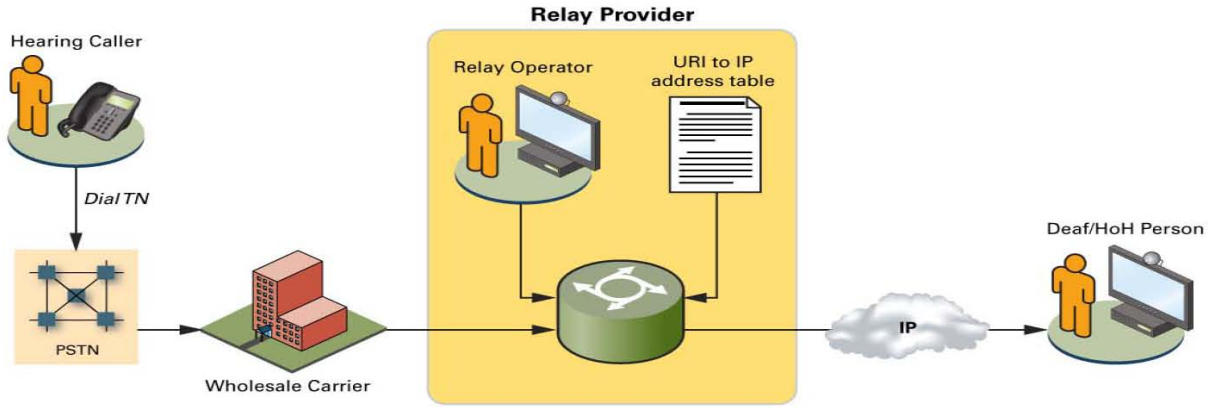
- Normal firewall protection for Deaf/HoH users
- Restricted Access to the entire system protects both users and providers
- No publicly available databases
- Fraud mitigation

5. Processing Calls Using TRU

TRU provides direct dial of most calls using the default relay provider. Caller selection of relay provider is also provided for both hearing to deaf/HoH and deaf/HoH to hearing calls. Direct dial of deaf/HoH to deaf/HoH is also provided.

5.1 Hearing to Deaf/HoH Calls

With the relay user having a telephone number and the NPAC as the central authoritative database, we are ready to describe how a hearing to Deaf/HoH call is completed. First we start with a "direct dialed" call. This is a call where the hearing user simply dials the telephone number of the Deaf/HoH user, and the call is routed using the Deaf/HoH person's default relay provider.

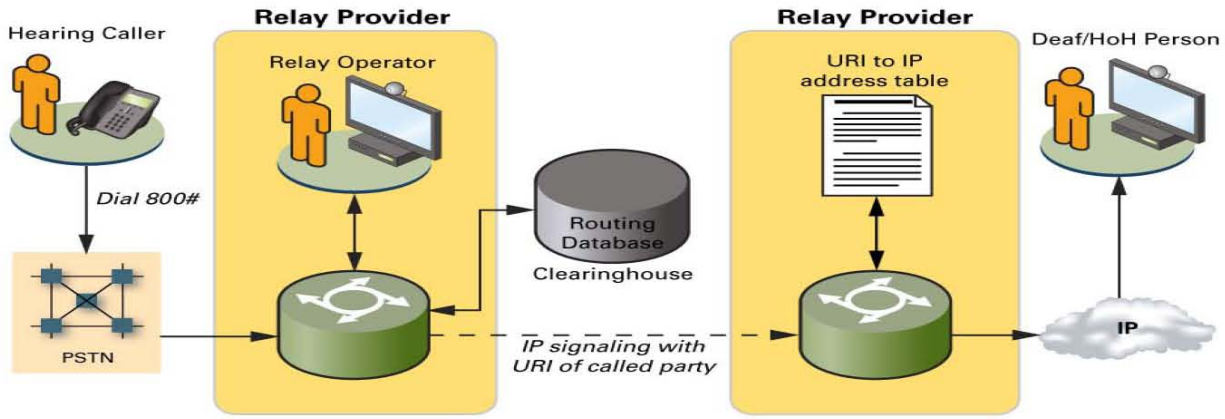


- The device "registers" when it boots. When the Deaf/HoH person turns on their communication device (Video Phone (VP) for VRS, computer or handheld for IP Relay, etc), it automatically "registers" itself with the user's chosen default relay provider. This process is a standard based way to allow internet devices to be recognized as being on the network using assigned IP addresses or URIs. This registration associates the URI of the user with the IP address of the device in a table maintained at the relay provider. The relay provider then knows how to contact the device when a call for the Deaf/HoH user arrives. This is the mechanism used by all VoIP devices and other existing standards based devices normally use this type of mechanism for this purpose.
- The hearing user places a call to the TN of the Deaf/HoH user. The call is routed by the PSTN to the network of the wholesale carrier allocated that TN.

- The wholesale carrier sends the call on to its customer, the relay provider. The called number is provided with the call.
- The relay provider allocates a RO to the call and identifies its subscriber's URI through a look-up to its registration and assignment table.
- With the URI, the relay provider looks up the IP address in its URI to IP Address table and creates an IP connection between the RO and the Deaf/HoH user.

Again, this is standards based signaling for both of the internet protocols H.323 and SIP which support communication devices, and off the shelf equipment can be used by the deaf and hearing impaired users.

We now turn to a hearing to Deaf/HoH call where the hearing person (the calling party) selects the relay provider.



- The hearing person dials the 800 number of their chosen relay provider.
- The caller supplies the telephone number of the Deaf/HoH person they wish to contact.
- The selected relay provider (VRS Provider A in the illustration above) queries its NPAC service provider with the TN and gets back the URI of the Deaf/HoH person.
- The originating relay provider routes the call using normal internet standards (sip/h.323) routing processes, which will reach the default relay provider chosen by the Deaf/HoH person.
- The system in the default relay provider will map URI to IP address, and pass the call to its subscriber.

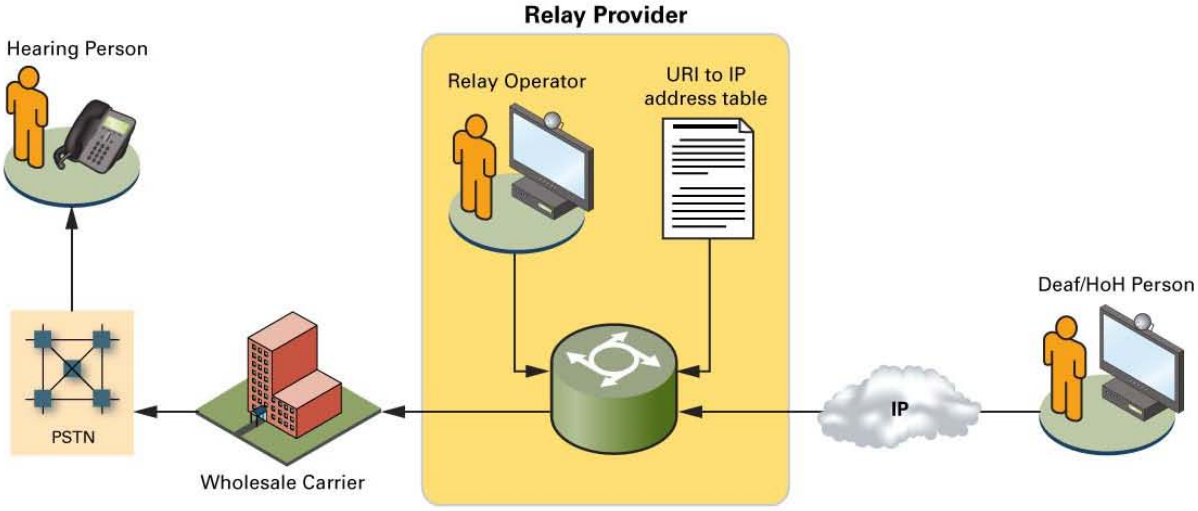
Again, this process is standards based, existing systems complete calls exactly this way. Any relay provider can complete a call to any user in the database, knowing only the telephone number of the desired called party.

The advantages of using this arrangement for hearing to Deaf/HoH calls are:

- Direct dialed calls using default relay provider as well as “dial around” capability with calling party choice of relay provider
- Any relay provider can complete a call to any Deaf/HoH person
- Standards based signaling using off the shelf equipment. protocols and procedures
- Significant positive security characteristics, please see “Security Issues” below

5.2 Deaf/HoH to Hearing calls

As with hearing to Deaf/HoH calls, there are direct dialed calls using the default relay provider, and calling party choice of relay provider.

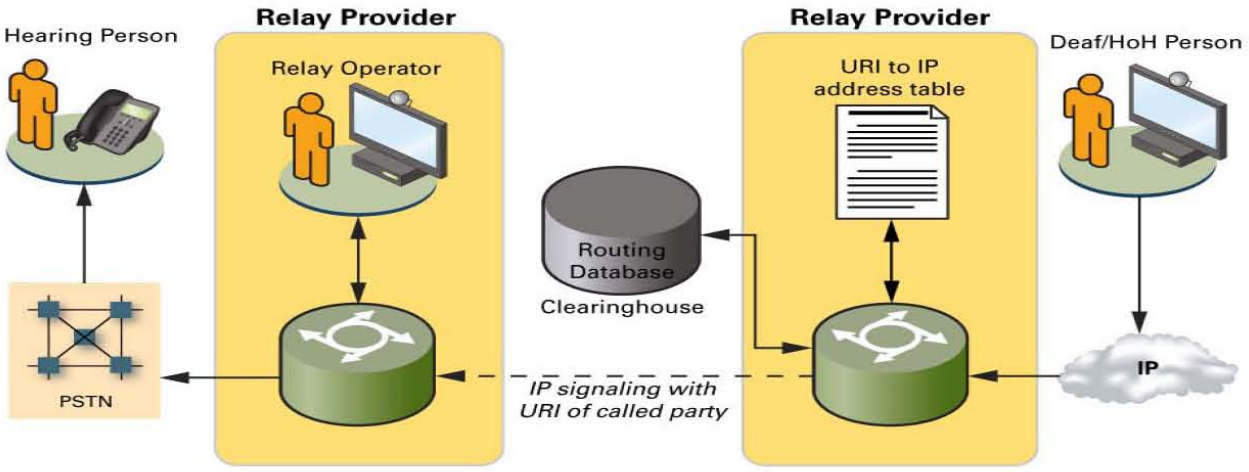


The path is nearly identical to the hearing to Deaf/HoH path, but in reverse.

- The Deaf/HoH person dials the TN of the hearing person
- The call is forwarded to the Deaf/HoH person’s default relay provider.
- The relay provider assigns a RO to the call, and hands the call to it’s underlying telephone carrier
- The carrier completes the call through the PSTN using its wholesale telephone carrier to the hearing user they are calling.

Most standards based off the shelf equipment can just “dial”, and the call will be placed as described.

The Deaf/HoH person can choose a different relay provider



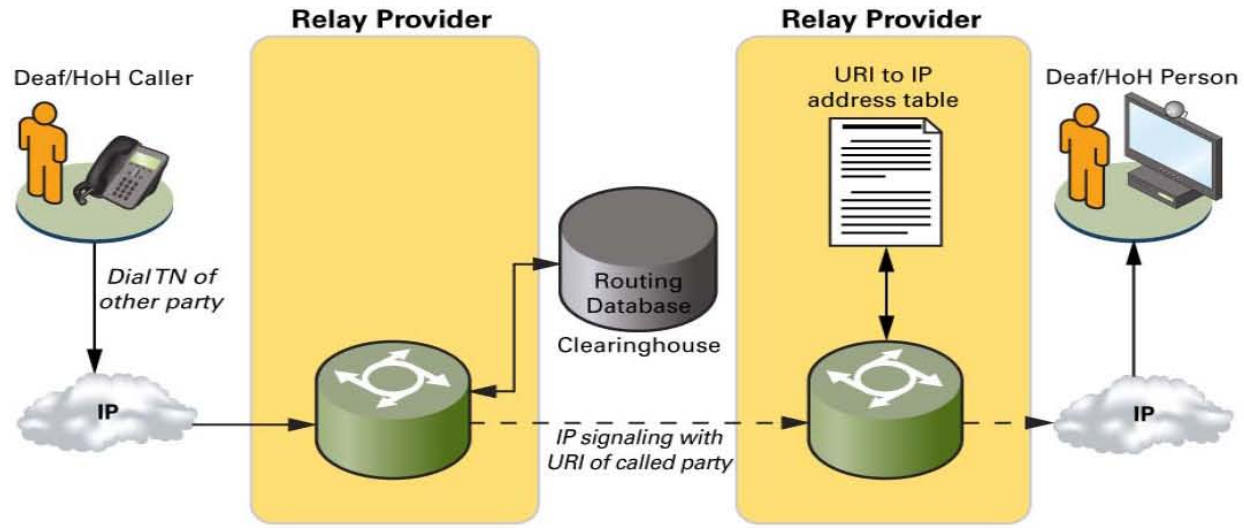
- The Deaf/HoH person calls her chosen (alternate) relay provider
- The call is sent to the default relay provider
- The default relay provider routes the call to the chosen provider
- The chosen provider assigns a RO to the call who obtains the desired called party's telephone number from the Deaf/HoH person
- The RO places a call through the (alternate) relay provider's underlying carrier
- The carrier completes the call through the PSTN to the hearing person

The advantages of the TRU solution for Deaf/HoH to hearing calls are:

- Direct dialed calls using default relay provider as well as "dial around" capability with calling party choice of relay provider
- Standards based signaling using off the shelf equipment. protocols and procedures
- Significant positive security characteristics, see "Security Issues" section below for more detail

5.3 Deaf/HoH to Deaf/HoH Calls

Deaf to Deaf calls do not need a RO. They are placed in many different ways that are very similar to other Internet video calls though it would require the two parties to have previously exchanged their IP addresses in order to set up a connection between them. TRU would allow these types of calls to maintain the ease of use and security that standards based system provides along with the ease of using a telephone number instead of an IP address to contact the called party.



We illustrate the worst case of the two Deaf/HoH person's using different default relay providers.

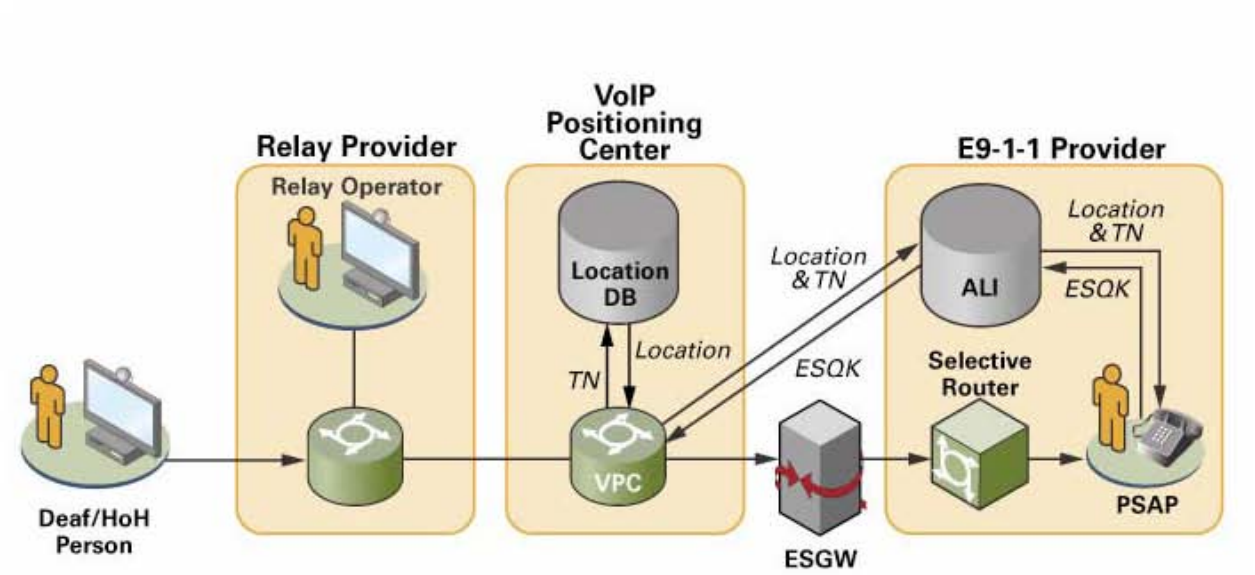
- The calling party dials the TN of the called party.
- The call is sent through the calling party's default relay provider
- The default provider queries the database for the URI of the called party.
- The call is sent to the relay provider serving the called party
- The called party's default provider looks up the IP address of its subscriber and completes the call to the called party.

The advantages of the TRU proposal for Deaf/HoH to Deaf/HoH calling are:

- Direct dialed calls using default relay provider as well as "dial around" capability with calling party choice of relay provider
- Standards based signaling using off the shelf equipment. protocols and procedures
- Significant positive security characteristics, please see "Security Issues" below

5.4 E9-1-1 Calls

The TRU proposal uses existing mechanisms to place 9-1-1 calls that are exactly the same as those used by VoIP carriers.



9-1-1 PSAPs are connected to "Selective Routers" which are special purpose telephone switches for 9-1-1 calls. Carriers and PSAPs connect to the selective router and it routes 9-1-1 calls to the proper PSAP based on the location of the caller. The PSAP has an Automatic Location Information (ALI) database which it queries to obtain the location of the caller. The VoIP 9-1-1 support involves two specialized service providers. One is a "VoIP Positioning Center" (VPC) which determines which PSAP should get the call. The other is the "Emergency Services Gateway" (ESGWs) network operator which has a series of gateways connected to the 9-1-1 selective routers. The VPC has a copy of a database created by the VoIP carrier (in TRU) the relay provider) which maps the telephone number to the correct PSAP location.

The process for placing a 9-1-1 call is as follows

- The user dials 9-1-1
- The call is routed to the default relay provider
- The default provider allocates a RO to the call on a priority basis.
- The RO extends the call to the VPC
- The VPC looks up the location in its copy of the database and determines which PSAP should get the call based on the location
- The VPC forwards the call to the ESGW network using a special key called an "Emergency Services Query Key" (ESQK).
- The ESGW network forwards the call to the ESGW connected to the selective router serving the destination PSAP.
- The selective router completes the call to the PSAP.\
- The PSAP queries ALI using the ESQK.
- The ALI steers the call to the VPC that processed it
- VPC returns the location and telephone number of the caller.

The PSAP call taker uses the RO to converse with the Deaf/HoH caller. If the call is lost, or after the call completes normally the PSAP needs to call the Deaf/HoH person back, they can use

the Deaf/HoH user's telephone number, as they would for any other caller. It should be noted that the VoIP mechanism used for relay obtains location from users, which is different from wireline or wireless callers.

Using the VoIP mechanism exactly the same as the VoIP carriers do offers a number of advantages to the TRU proposal:

- Proven, easily deployed solution
- Identical service to other VoIP users
- Calls arrive via the selective router, with automatically provided location and call-back information
- Lowest cost, making use of existing services and service providers exactly the same as other types of customers
- Relay providers choose from several competitive VPC and ESGW operators in an open and free market

10. Summary

The TRU proposal suggests:

1. Users register with a "default" relay provider of their choice
2. Relay providers obtain telephone numbers from wholesale CLECs and ILECs similar to how VoIP providers obtain telephone numbers and assign them to users who do not already have one
3. Telephone numbers be fully portable between providers. Existing numbers should be able to be ported in to a Relay provider and ported out to any other telecommunications carrier
4. The NPAC be expanded to hold a URI (sip: or h323) of VRS users
5. Relay providers work with their underlying telephone carriers to populate the URI field for all of their subscribers
6. Relay providers obtain access to NPAC data, either directly or through an authorized NPAC service provider
7. Relay providers support standardized signaling between relay providers, and, ideally from all devices
8. Relay providers implement "proxy/gatekeeper routing" for all subscribers, restricting access to their systems by suitable credential verification processes
9. Relay providers provide interpreted, direct dialed incoming call access to their subscribers
10. Relay providers provide interpreted, direct dialed outgoing call service to their subscribers
11. Relay providers permit any other relay provider to extend incoming calls to their subscribers by mapping telephone number to URI using the NPAC, and sending standardized signaling towards the default relay provider
12. Relay providers permit subscribers to use any other relay provider for an outgoing call by forwarding standards based signaling from their subscriber towards the selected relay provider

13. Relay providers permit subscriber to subscriber (of any relay provider) by direct dial, using mapping telephone number to URI using the NPAC and sending standardized signaling towards the default relay provider
14. Relay providers support 9-1-1 service identically to VoIP 9-1-1 support
15. Relay providers support all calling services with normal residential firewall configurations
16. Relay providers restrict access to signaling to their own subscribers and other relay providers (and by extension, subscribers of other relay providers)

We note that TRU applies to ALL forms of relay, not just IP based relay. A TTY or STS user could enjoy all the benefits of TRU including a telephone number that, when direct dialed by a hearing person, automatically engages TRS/STS. The TTY/STS user would actually have two telephone numbers, one which directly reached his device, and the other that reached him via relay.

NeuStar believes that by using existing industry databases, existing processes and procedures, existing standardized signaling, existing 9-1-1 processes, service providers and procedures, and proven security mechanisms, that telephone numbers for Deaf/HoH users can be implemented in much less than the six month timeframe anticipated by the FCC. The extensions required (one new field in the NPAC and the processes to implement it) represent the simplest, most direct, and fully featured way to achieve the goals of all stakeholders in this discussion. *TRU* requires no new entity (LLC) to be created and uses existing industry management processes and cost recovery mechanisms, including FCC oversight of the process, to affect a sound and expedite solution.

NeuStar believes this is the fastest and least expensive method to provide functionally equivalent and cost effective service to Deaf/HoH community.